

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 32

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KLAUS FLORIAN SCHUEGRAF, SCOTT JEFFREY DEBOER
and RANDHIR P. S. THAKUR

Appeal No. 2001-1184
Application 08/902,809

ON BRIEF

MAILED

FEB 26 2003

PAT. & T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Before HAIRSTON, FLEMING, and LEVY, **Administrative Patent Judges.**

FLEMING, **Administrative Patent Judge.**

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 23 through 31 and 36 through 44. Claims 1 through 22 and 32 through 35 have been canceled.

The invention relates to fabricating semiconductor devices, and in particular, to controlling oxide formation during reoxidation. See page 1 of the Appellants' specification. Appellants' Figure 2A is a cross-sectional view of a portion of an in-process semiconductor wafer following gate line masking and

a subsequent dry etch of the exposed silicon nitride, using the polysilicon layer as the etch stop. Figure 2B is a cross-sectional view of the portion of an in-process semiconductor wafer depicted in Figure 2A following selective spacer deposition according to one embodiment of the present invention. See page 3 of Appellants' specification. Figure 2B shows an electrode 205 over active area 215. Figure 2B also shows a spacer 210 comprising silicon nitride or an amorphous silicon film covering the surface of the feature 205 and terminating at the boundary where the spacer is not in contact with the active area 215. See page 4 of Appellants' specification.

Independent claim 23 present in the application is reproduced as follows:

23. A semiconductor device comprising:

an oxide layer;

at least one feature over the oxide layer, the feature having a surface and being contiguous with the oxide layer at a boundary; and

a spacer comprising silicon nitride or an amorphous silicon film covering the surface of the feature and terminating at the boundary wherein the spacer is not in contact with the oxide layer.

References

The references relied on by the Examiner are as follows:

McLevige	4,711,701	Dec. 8, 1987
Ho et al. (Ho)	5,364,804	Nov. 15, 1994
Gonzalez	5,608,249	Mar. 4, 1997
	(filing date	Nov. 16, 1995)
Keller et al. (Keller)	5,707,898	Jan. 13, 1998
	(filing date	Apr. 1, 1996)

Rejections at Issue

Claims 23 through 31 and 36 through 44 stand rejected under 35 U.S.C. § 112, first paragraph, for claiming subject matter that is not described at the time of filing of Appellants' application.

Claims 23, 25 through 27, 29, 30, 36, 38, 42 and 44 stand rejected under 35 U.S.C. § 103 as being unpatentable over Ho and Keller in view of McLevige.

Claims 24, 28, 31, 37, 39 through 41 and 43 stand rejected under 35 U.S.C. § 103 as being unpatentable over Ho, Keller and McLevige and further in view of Gonzalez.¹

¹The Examiner has withdrawn the rejection of claims 26 through 31, 36 through 41 and 44 under 35 U.S.C. § 112, second paragraph. See page 2 of the Examiner's answer.

Rather than repeat the arguments of Appellants or Examiner, we make reference to the briefs² and the answer for the respective details thereof.

OPINION

With full consideration being given the subject matter on appeal, the Examiner's rejections and the arguments of Appellants and Examiner, for the reasons stated *infra*, we will not sustain the Examiner's rejection of claims 23 through 31 and 36 through 44 under 35 U.S.C. § 112, first paragraph, and we will not sustain the Examiner's rejection of claims 23 through 31 and 36 through 44 under 35 U.S.C. § 103.

We first will address the rejection of the claims under 35 U.S.C. § 112, first paragraph. The Examiner argues that the specification does not describe layer 215 shown in Figures 2B and 2C as being an oxide layer and thereby it's improper to claim an oxide layer.

²Appellants filed an appeal brief on August 7, 2000. Appellants filed a reply brief on November 30, 2000. The Examiner mailed an office communication on December 6, 2000, stating that the reply brief has been considered and entered.

Appellants argue that the specification of the present application, as filed, clearly allows persons skilled in the art to recognize that what was originally described and shown as active area 215 is a layer of oxide. See page 6 of the brief. Appellants argue that the area 215 was originally described as "active area 215," on page 4, line 27, and on page 5, lines 5 and 6 of the specification. The focus of the description is on the selective spacer 210 which is deposited only on the electrode 205 and not on the area 215 because of the phenomenon shown in figure 1. Appellants argue that figure 1 illustrates that a deposition of the spacer materials on the polysilicon 110 occurs more rapidly than the deposition on oxide 120 because of the difference in incubation time 130 on dissimilar materials makes selective spacer deposition possible. Appellants point to the specification page 4, lines 8 through 12. Appellants argue that the specification later states that figures 2A to 2D show that this incubation time difference 130 can be exploited for selective spacer deposition. Appellants point to the specification, page 4, lines 19 through 20. Appellants argue that one skilled in the art looking at the specification as a whole would understand that the area 215 must be an oxide.

"[T]he written description must include all of the limitations . . . or the applicant must show that any absent text is necessarily comprehended in the description provided and would have been so understood at the time the patent application was filed." **Hyatt v. Boone**, 146 F.3d 1348, 1354-1355, 47 USPQ2d 1128, 1132 (Fed. Cir. 1998).

"The function of the description requirement [of the first paragraph of 35 U.S.C. 112] is to ensure that the inventor had possession, as of the filing date of the application relied on, of the specific subject matter later claimed by him." **In re Wertheim**, 541 F.2d 257, 262, 191 USPQ 90, 96 (CCPA 1976). "It is not necessary that the application describe the claim limitations exactly, . . . but only so clearly that persons of ordinary skill in the art will recognize from the disclosure that Appellants invented the processes including those limitations." **Wertheim**, 541 F.2d at 262, 191 USPQ at 96 **citing In re Smythe**, 480 F.2d 1376, 1382, 178 USPQ 279, 284 (CCPA 1973). Furthermore, the Federal Circuit points out that "[i]t is not necessary that the claimed subject matter be described identically, but the disclosure originally filed must convey to those skilled in the art that applicant had invented the subject matter later

claimed." *In re Wilder*, 736 F.2d 1516, 1520, 222 USPQ 369, 372 (Fed. Cir. 1984), **cert, denied**, 469 U.S. 1209 (1985), **citing In re Kaslow**, 707 F.2d 1366, 1375, 217 USPQ 1089, 1096 (Fed. Cir. 1983). "To fulfill the written description requirement, the patent specification 'must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed.'" *Centry Gallery Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479, 45 USPQ 1498, 1503 (Fed. Cir. 1998) **citing In re Gosteli**, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989).

Upon our review of Appellants' description of Figures 2B and 2C, we agree with the Examiner that the description does not explicitly state that active area 215 is an oxide layer. If this was all that was required for determining proper description, our inquiry would end. However, our reviewing court requires us to determine whether the specification as a whole would have conveyed to those skilled in the art at the time of filing that the Appellants had possession of the claimed invention. When reading the specification as originally filed as a whole, we agree with the Appellants that we must consider the meaning of Figure 1 and how it relates to Figures 2A through 2D. The

Appellants' specification states that Figure 1 provides a graphical representation of the physical phenomena which the selective spacer process employs. See page 4, lines 7 through 8. The specification further states that the example presented in Figure 1 shows that the deposition of spacer materials on polysilicon 110 occurs more rapidly than deposition on oxide 120. See Appellants' specification, page 4, lines 8 through 9. Appellants' specification further describes that Figures 2A through 2D shows that this incubation time difference 130 can be exploited for selective spacer deposition, encapsulating refractory metal prior to polycide reoxidation. See Appellants' specification, page 4, lines 19 through 21. The specification further states that represented in Figures 2B and 2C, a selective spacer 210 is deposited such that the amount deposited on the polysilicon and refractory metal 205 is less than the incubation thickness, leaving the active area 215 free of deposition. See Appellants' specification, page 4, lines 24 through 27. We find from reading these portions of the specification provides evidentiary support for the Appellants' argument that one of ordinary skill in the art at the time of filing reading the originally filed specification would have recognized that Appellants had possession of their claimed invention.

Therefore, we will not sustain the Examiner's rejection of the claims under 35 U.S.C. § 112, first paragraph.

We now turn to the rejection of claims 23, 24 through 27, 29, 30, 36, 38, 42 and 44, under 35 U.S.C. § 103 as being unpatentable over Ho and Keller in view of McLevige. Appellants agree that Ho does disclose that the purpose of the silicon nitride layer 28 shown in figure 9 is to provide a more vertical sidewall than the oxide layer 26. Appellants argue that Ho does not disclose the spacer comprising silicon nitride or an amorphous silicon film extending to and terminating at the boundary between the first layer of oxide and the sidewalls of the electrode as claimed. See page 14 of Appellants' brief.

Appellants also argue that Keller does not supply the missing elements in Ho. Referring to Figure 2, Appellants agree that Keller teaches a gate construction 16A including outer sidewalls 23 having an oxide layer 24. Appellants further agree that Keller teaches that the gate construction 16A further includes sidewall spacers 26 typically comprising silicon dioxide. Appellants, however, argue that Keller does not show the spacer comprising silicon nitride or an amorphous silicon

film extending to or terminating at the boundary between the first layer of oxide and the sidewalls of the electrode as claimed. See page 15 of the brief.

Appellants argue that McLevige does not supply the missing elements in Ho and Keller. Appellants agree that Figure 2D of McLevige does disclose a sidewall deposition of silicon dioxide 64 and an underlying silicon nitride 38. Appellants agree with Examiner that McLevige does state in column 5, lines 18 through 20, that "[i]n the case that the silicon nitride layer is omitted, the silicon dioxide could be replaced by silicon nitride." Appellants argue that there is no indication that in this statement McLevige is referring to the sidewall deposition of silicon dioxide 64 and the layer of silicon nitride 38. Appellants argue that therefore McLevige does not disclose the spacer comprises silicon nitride or an amorphous silicon film extending to and terminating at the boundary between the first layer of oxide and the sidewall of the electrode as claimed. See pages 16 and 17 of Appellants' brief.

The Examiner states that although McLevige does not state that the statement found in column 5, lines 18 through 20, refers to spacer 64 and layer 38, the Examiner argues that it is clear that McLevige refers to spacer 64 and layer 38 because there is

only one layer comprising silicon nitride, layer 38. See pages 6 and 13 of the Examiner's answer. The Examiner also argues that McLevige further teaches that layers 62, 64 and 66 are formed during one deposition of a silicon dioxide. The Examiner argues that all three layers must be formed of the same material. The Examiner points out that there is no reference in McLevige's invention to other layers comprising silicon nitride and silicon dioxide. The Examiner argues that it is clear that the above statement means that layer 38 should be omitted and layers 62, 64 and 66 are formed of silicon nitride. See pages 6 and 7, and page 13 of the answer.

Appellants argue that the Examiner is requiring that one of ordinary skill in the art go through an elaborate exercise in speculation to interpret McLevige's simple statement in column 5, lines 18 through 20. Appellants point out that McLevige never states that it would be possible to replace layer 38 alone. Appellants point out that McLevige states in column 5, lines 18 through 20, that the substitution of silicon nitride for silicon dioxide takes place only with the admission of the silicon nitride layer. Appellants argue that McLevige does not suggest or disclose the spacer comprising silicon nitride or an amorphous

silicon film extending to and terminating at a boundary between the first layer of oxide and the sidewalls of the electrode as claimed.

In rejecting claims under 35 U.S.C. § 103, the Examiner bears the initial burden of establishing a **prima facie** case of obviousness. **In re Oetiker**, 977 F.2d 1443, 1445, 24 USPQ 1443, 1444 (Fed. Cir. 1992). **See also In re Piasecki**, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). The Examiner can satisfy this burden by showing that some objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art suggests the claimed subject matter. **In re Fine**, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Only if this initial burden is met does the burden of coming forward with evidence or argument shift to the Appellants. **Oetiker**, 977 F.2d at 1445, 24 USPQ at 1444. **See also Piasecki**, 745 F.2d at 1472, 223 USPQ at 788.

An obviousness analysis commences with a review and consideration of all the pertinent evidence and arguments. "In reviewing the [E]xaminer's's decision on appeal, the Board must necessarily weigh all of the evidence and arguments." **In re Oetiker**, 977 F.2d at 1445, 24 USPQ2d at 1444. "[T]he Board must

not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion." **In re Lee**, 277 F.3d 1338, 1344, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002).

When determining obviousness, "the [E]xaminer can satisfy the burden of showing obviousness of the combination 'only by showing some objective teaching in the prior art or individual to combine the relevant teachings of the references'". **In re Lee**, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002), **citing In re Fritch**, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). "Broad conclusory statements regarding the teaching of multiple references, standing alone, are not 'evidence.'" **In re Dembiczak**, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617. "Mere denials and conclusory statements, however, are not sufficient to establish a genuine issue of material fact." **Dembiczak**, 175 F.3d at 999, 50 USPQ2d at 1617, **citing McElmurry v. Arkansas Power & Light Co.**, 995 F.2d 1576, 1578, 27 USPQ2d 1129, 1131 (Fed. Cir. 1993).

The Federal Circuit states that, "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." **In re Fritch**, 972 F.2d 1260, 1266 n.14, 23 USPQ2d 1780, 1783-83 n.14 (Fed. Cir. 1992), **citing In re Gordon**, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). In addition, our reviewing court stated in **In re Lee**, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002), that when making an obviousness rejection based on combination, "there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by Applicant" (**quoting In re Dance**, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998)).

Upon our careful review of McLevige, we fail to find that the Examiner has met the Examiner's burden of showing a motivation, suggestion or teaching why one of ordinary skill in the art would make the modification as proposed by the Examiner. In particular, the Examiner has relied on column 5, lines 18 through 20, of McLevige which states that "[i]n the case that the silicon nitride layer is omitted, the silicon dioxide could be replaced by silicon nitride." However, this sentence is the last

sentence of a paragraph which begins in column 5, line 3. McLevige further teaches that a third or more layers could be added to the structure and the silicon nitride layer could be omitted, except without the silicon nitride acting as cap during the annealing of the implants during other provisions such as the arsenic atmosphere would be needed. From the entire reading of the paragraph, it appears that McLevige is only suggesting possible future experimentation and is not suggesting the proposed modification by the Examiner. Without further evidence, we cannot speculate as to how these modifications proposed in column 5 of McLevige would result in a structure. Therefore, we fail to find that the Examiner has provided sufficient evidence of combinablity for one of ordinary skill in the art to make modifications of the art cited to obtain the Appellants' invention as claimed. Therefore, we will not sustain the Examiner's rejection of claims 23, 25 through 27, 29, 30, 36, 38, 42 and 44 under 35 U.S.C. § 103.

We now turn to the rejection of claims 24, 28, 31, 37, 39 through 41 and 43 under 35 U.S.C. § 103 as being unpatentable over Ho, Keller, and McLevige and further in view of Gonzalez. We note that Gonzales also fails to provide any reason why one of


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ordinary skill in the art would make the proposed Examiner's modification. Therefore, for the same reasons as above, we will not sustain this rejection as well.

In view of the foregoing, we have not sustained the Examiner's rejection of claims 23 through 31 and 36 through 44 under 35 U.S.C. § 112, first paragraph, and 35 U.S.C. § 103.

REVERSED


KENNETH W. HAIRSTON
Administrative Patent Judge


MICHAEL R. FLEMING
Administrative Patent Judge


STUART S. LEVY
Administrative Patent Judge

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